



Power Utility Level of Service



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PRESENTATION AGENDA

- 🌀 Measuring Level of Service
- 🌀 2016 How did we do?
- 🌀 How we compare
- 🌀 Worst Sections of Town
- 🌀 Over the Years
- 🌀 Reasons for Outages
- 🌀 Overhead vs Underground
- 🌀 Getting on top of Maintenance
- 🌀 Keeping up with Reliability
- 🌀 In Summary



MEASURING LEVEL OF SERVICE

- ⌚ **System Average Interruption Duration Index (SAIDI)**
 - ⌚ The average total outage duration per customer, per year
- ⌚ **System Average Interruption Frequency Index (SAIFI)**
 - ⌚ The average number of interruptions per customer, per year
- ⌚ **Customer Average Interruption Duration Index (CAIDI)**
 - ⌚ The average total outage duration per customer, per interruption
- ⌚ **Average Service Availability Index (ASAI)**
 - ⌚ The percentage of time customers have electricity, system wide



**Reliable Public
Power Provider**

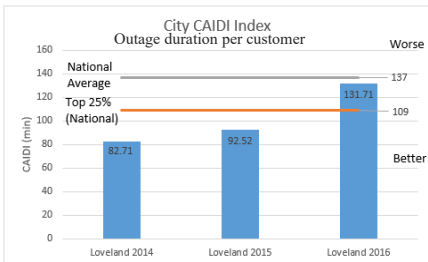
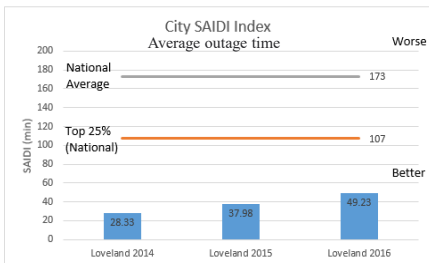
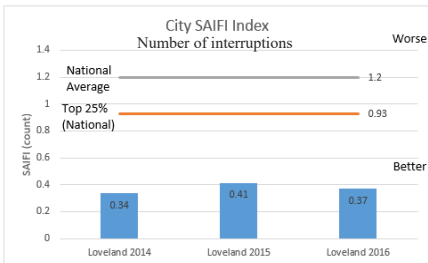


2016 HOW DID WE DO?

- ⌚ **Customers Served: 35,934**
- ⌚ **1 Major Event Day: March 23, 2016**
- ⌚ **In General:**
 - ⌚ **SAIDI:** 49 minutes of average outage time per customer
 - ⌚ **SAIFI:** Customers experienced 0.4 interruptions
 - ⌚ **CAIDI:** 2 hours 10 minutes of outage duration per customer during an interruption
 - ⌚ **ASAI:** The overall system availability was 99.9907%



HOW WE COMPARE



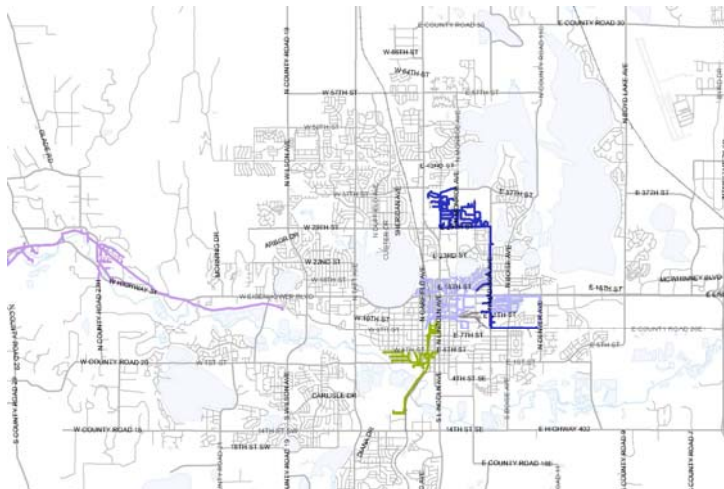
City of Loveland:

- Ranks in the top 25% of reporting utilities
- Is nearing national average on length of outages

* National comparisons presented are from reporting utilities in 2015



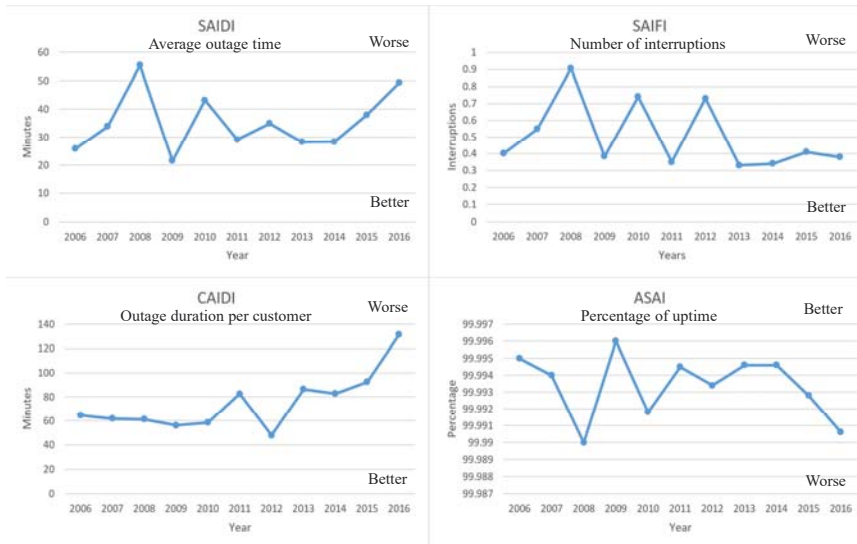
WORST SECTIONS OF TOWN



Circuit ID	SAIFI (Interruptions)	SAIDI (minutes)	CAIDI (minutes)	ASAI (%)
911	4.4	515	116	99.90
224	3.4	257	76	99.95
231	1.0	93	93	99.98
421	0.9	39	45	99.99



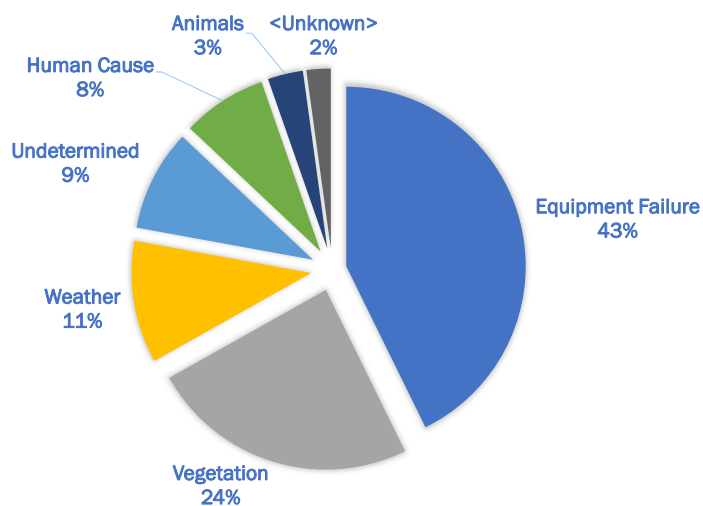
OVER THE YEARS



In General:

- Outages per customer is stable
- Customers are experiencing longer outages
- Overall system reliability is decreasing

REASONS FOR OUTAGES



OVERHEAD VS. UNDERGROUND

The City of Loveland is 83% underground

UNDERGROUND

- Less frequent interruptions
- Longer duration of interruptions
- Outages are generally related to equipment
- Shorter lifespan of equipment



OVERHEAD

- More frequent interruptions
- Easier to find, shorter duration
- More susceptible to human caused outages, animal contact and weather
- Longer lifespan



GETTING ON TOP OF MAINTENANCE

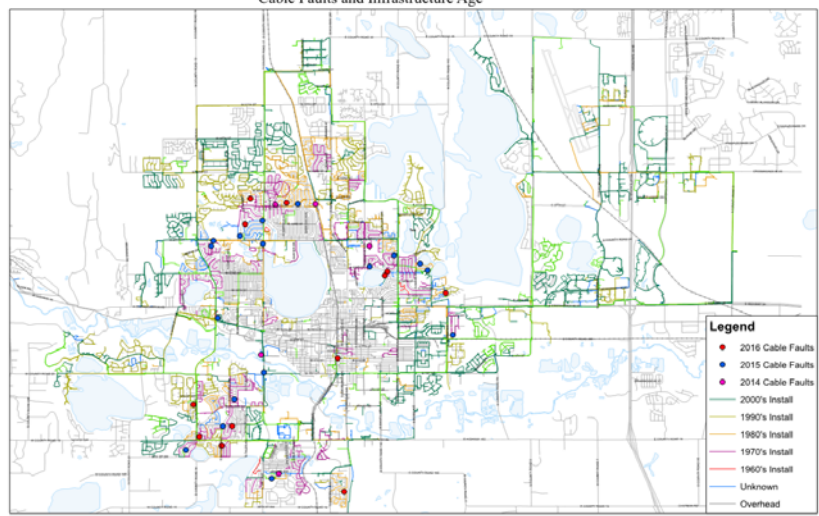
City of Loveland 2014-2016
Cable Faults and Infrastructure Age

Need for Cable Replacement Priorities and Plans

- Aging infrastructure areas
- High failure areas
- Having the data is not good enough, we need to analyze the data and keep it a priority

Financial constraints

- Competing Priorities
 - Development driven projects take priority
 - Maintenance becomes a lower priority



KEEPING RELIABILITY UP

Asset management and regular inspections

- We perform inspections on vital equipment periodically
- We need to use inspection data to identify possible problems

System maintenance

- We track system issues
- We need to use data to pinpoint system maintenance and replacement
- We need to keep system maintenance a priority, despite current struggles to meet new demand
- New in 2017: We have started a maintenance crew to focus on these issues working closely with operations and engineering



Fuse loading investigations

- Is our system able to meet peak demand in it's current state



IN SUMMARY



City of Loveland reliability is trending downwards, but...

- We are still in the top tiers of the nation
- We are working on staying in the top tiers of the nation

Next steps for maintenance

- Continue working with maintenance crew
- Leveraging system data for effective use of funds
- Continuing to track system assets while developing a more sound asset management system
- Ensure system maintenance continues to be a priority





QUESTIONS?